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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Masaaki Ukita

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23353

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RADER FISHMAN & GRAUER PLLC  
LION BUILDING  
1233 20TH STREET N.W., SUITE 501  
WASHINGTON, DC 20036

EXAMINER

MIDKIFF, ANASTASIA

ART UNIT

PAPER NUMBER

2882

DATE MAILED: 11/20/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/516,524	Applicant(s) UKITA, MASA AKI	
	Examiner Anastasia Midkiff	Art Unit 2882	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 17 August 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-5 and 7-17 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5 and 7-17 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Claim Objections***

Claims 7 and 13 are objected to because of the following informalities:

With respect to Claim 7, the claim refers to "An apparatus as defined in claim 6" wherein Claim 6 has been cancelled. For the sake of examination, the Examiner has assumed that Claim 7 should now depend upon Claim 1.

With respect to Claim 13, in Line 2, the phrase "an bore" is grammatically incorrect. The Examiner suggests replacing "an bore" with --a bore--.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-2, 11-13, and 15-16 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for specific vibration applying means does not reasonably provide enablement for every conceivable structure (means) for achieving the stated property (result) of vibrating the target in directions parallel to a surface thereof. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention commensurate in scope with these claims. A single means claim, *i.e.*, where a means recitation does not appear in combination with another recited element of means, is

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subject to an undue breadth rejection under 35 USC 112, first paragraph. *In re Hyatt*, 708 F.2d 712, 714-715, 218 USPQ 195, 197 (Fed. Cir. 1983). (See MPEP 2164.08(a).)

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-5, 7-10, 12, 13, 15, and 16, as they are best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over DuMond (USP# 2,133,606) in view of U.S. Patent to Hirokawa et al. (USP# 5,134,640).

With respect to Claim 1, DuMond teaches an apparatus for generating x-rays by irradiating a target (11) with an electron beam (26, Figures 2 and 2a), comprising: vibration applying means (12) for vibrating said target in directions parallel to a surface thereof (Figure 2, and Page 2 Column 2 Lines 63-75 through Column 2 Lines 1-8 and 56-59).

DuMond does not teach said vibration applying means includes a piezoelectric device.

Hirokawa et al. teach a piezoelectric device (18, 19) as an alternate, equivalent means for a motor to apply vibration (Column 4 Lines 19-35, and Figure 2) to an x-ray target window (14) or x-ray mirror (13) in an x-ray tube (21, 22).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the piezoelectric device of Hirokawa et al. as the vibration applying means of DuMond, such devices known to be substituted for motor vibration means with a reduction in parts, as taught by Hirokawa et al.

With respect to Claim 2, DuMond further teaches said vibration applying means (12) is arranged to vibrate said target (11) so that said electron beam (26) has a colliding spot (at 26) describing a circular track on said target (Page 2 Column 2 Lines 70-75, Page 3 Column 1 Lines 1-7, and Figure 2a).

With respect to Claims 3 and 4, DuMond further teaches the apparatus comprises a vibration controller (42) for controlling said vibration applying means (Page 3, Column 1, Lines 64-71) based on an electron beam diameter (Page 3, Column 2, Lines 46-49), said controller arranged to control the magnitude of vibration amplitude, the magnitude of the vibration amplitude being more than the electron beam diameter (Page 3, Column 1 Lines 71-75 and Column 2 Lines 1-7).

With respect to Claim 5, DuMond further teaches said vibration controller (42) is arranged to make the vibration frequency variable (Page 3, Column 2, Lines 46-75).

With respect to Claim 7, DuMond further teaches that vibration applying means is integrated with target holder (28, 29) to define a closed space (Figure 1).

With respect to Claims 8 and 9, DuMond further teaches apparatus further comprises a target holder (13) with flexures (31) for attaching and supporting said holder (Page 2, Column 2, Lines 24-40). With respect to said flexures known to be made by electrical discharge machining, this is a process by which a product is made,

wherein the process does not impose any structural limitation on the product, and, as such, the process is not given any patentable weight (See MPEP 2113).

With respect to Claim 10, DuMond further teaches said target (11) is vacuum-sealed by rubber elements or fixtures (Page 2, Column 2, Lines 26-46).

With respect to Claim 12, DuMond further teaches said vibration applying means (12) is arranged to displace said target (11, Figures 2 and 2a).

With respect to Claim 13, DuMond further teaches said vibration applying means (12) is disposed in a bore (2) in which said target (11) is located (Figure 1).

With respect to Claim 15, DuMond further teaches said target (11) has a thickness corresponding to a diameter of said electron beam colliding with said target (26, Figures 2 and 2a).

With respect to Claim 16, DuMond further teaches said target (11) is disposed at an angle to said electron beam (Figure 2).

Claims 1-5, 8, 9, 12, 13, 15, and 16, as they are best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent to Catlin (USP# 1,997,676) in view of Hirokawa et al. (USP# 5,134,640).

With respect to Claim 1, Catlin teaches an apparatus for generating x-rays by irradiating a target (20, 52, 54, 55) with an electron beam (Figures 1-10), comprising vibration applying means (22) for vibrating said target in directions parallel to a surface thereof (Figures 1-10 and Page 2 Column 2 Lines 1-18).

Catlin does not teach said vibration applying means includes a piezoelectric device.

Hirokawa et al. teach a piezoelectric device (18, 19) as an alternate, equivalent means for a motor to apply vibration (Column 4 Lines 19-35, and Figure 2) to an x-ray target window (14) or x-ray mirror (13) in an x-ray tube (21, 22).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the piezoelectric device of Hirokawa et al. as the vibration applying means of Catlin, such devices known to be substituted for circuitry-driven motor vibration means with a reduction in parts, as taught by Hirokawa et al.

With respect to Claim 2, Catlin further teaches said vibration applying means (22) is arranged to vibrate said target (20, 52, 54, 55) so that said electron beam has a colliding spot describing a linear, circular, or two-dimensionally shaped track on said target (Page 3, Column 1, Lines 17-27).

With respect to Claims 3 and 4, Catlin further teaches the apparatus comprises a vibration controller for controlling said vibration applying means (Page 2, Column 2, Lines 10-66) based on a tube current and voltage (Page 2, Column 2, Lines 33-40), said controller arranged to control the vibration amplitude more than the electron beam diameter and variable (Page 2, Column 2, Lines 52-62).

With respect to Claim 5, Catlin further teaches said vibration controller is arranged to make the vibration frequency variable (Page 2 Column 2 Lines 13-18 and 52-62).

With respect to Claim 7, Catlin further teaches vibration applying means integrated with target holder to define a closed space (Figures 1-10).

With respect to Claims 8 and 9, Catlin further teaches apparatus further comprises a target holder (23) with flexures (26) for attaching and supporting said holder (Page 1 Column 1 Lines 20-30). With respect to said flexures known to be made by electrical discharge machining, this is a process by which a product is made, wherein the process does not impose any structural limitation on the product, and, as such, the process is not given any patentable weight (See MPEP 2113).

With respect to Claim 12, Catlin further teaches said vibration applying means (22) is arranged to displace said target (20, 52, 54, 55, Figures 1-10).

With respect to Claim 13, Catlin further teaches said vibration applying means (22) is disposed in a bore (24) in which said target (20, 52, 54, 55) is located (Figures 1-10).

With respect to Claim 15, Catlin further teaches said target (20, 52, 54, 55) has a thickness corresponding to a diameter of collision of said electron beam (Figures 1-10).

With respect to Claim 16, Catlin further teaches said target (52, 54) is disposed at an angle to said electron beam (Figures 6 and 7).

Claims 1, 2, 8-10, 12, 13, and 14, as they are best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent to Carter (USP# 3,737,698) in view of Hirokawa et al.



With respect to Claim 1, Carter teaches an apparatus for generating x-rays by irradiating a target (48, 50) with an electron beam (Figure 1), comprising vibration applying means (20, 12) for vibrating said target in directions parallel to a surface thereof (Column 2, Lines 39-51).

Carter does not teach said vibration applying means includes a piezoelectric device.

Hirokawa et al. teach a piezoelectric device (18, 19) as an alternate, equivalent means for a motor to apply vibration (Column 4 Lines 19-35, and Figure 2) to an x-ray target window (14) or x-ray mirror (13) in an x-ray tube (21, 22).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the piezoelectric device of Hirokawa et al. as the vibration applying means of Carter, such devices known to be substituted for circuitry-driven motor vibration means with a reduction in parts, as taught by Hirokawa et al.

With respect to Claim 2, Carter further teaches said vibration applying means (20, 12) is arranged to vibrate said target (48, 50) so that said electron beam has a colliding spot describing a linear shaped track on said target (Column 2 Lines 39-51, and Column 3 Lines 13-16).

With respect to Claims 8 and 9, Carter further teaches apparatus further comprises a target holder (12) with flexures (40, 42) for attaching and supporting said holder (Figure 1). With respect to said flexures known to be made by electrical discharge machining, this is a process by which a product is made, wherein the process

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does not impose any structural limitation on the product, and, as such, the process is not given any patentable weight (See MPEP 2113).

With respect to Claim 10, Carter further teaches said target (48, 50) is vacuum-sealed by rubber elements or fixtures (42, Column 2 Lines 34-37).

With respect to Claim 12, Carter further teaches said vibration applying means (20, 12) is arranged to displace said target (48, 50, and Column 2 Lines 39-51).

With respect to Claim 13, Carter further teaches said vibration applying means (20, 12) is disposed in a bore (14) in which said target (48, 50) is located (Figure 1).

With respect to Claim 14, Carter further teaches said flexures (40, 42) are shaped thin in a direction of vibration of said target, and thick in a direction perpendicular to the direction of vibration (Figure 1).

Claims 1-4, 11, 12, and 16, as they are best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent to Price et al. (USP# 6,560,315) in view of Hirokawa et al.

With respect to Claim 1, Price et al. teach an apparatus for generating x-rays by irradiating a target (122) with an electron beam (148), comprising vibration applying means (Column 4 Lines 53-57, and Column 5 Lines 60-64) for vibrating said target in directions (138) parallel to a surface thereof (Column 4, Lines 18-23 and Figure 3).

Price et al. do not teach said vibration applying means includes a piezoelectric device.

Hirokawa et al. teach a piezoelectric device (18, 19) as an alternate, equivalent means for a motor to apply vibration (Column 4 Lines 19-35, and Figure 2) to an x-ray target window (14) or x-ray mirror (13) in an x-ray tube (21, 22).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the piezoelectric device of Hirokawa et al. as the vibration applying means of Price et al., such devices known to be substituted for circuitry-driven motor vibration means with a reduction in parts, as taught by Hirokawa et al.

With respect to Claim 2, Price et al. further teach said vibration applying means is arranged to vibrate said target (122) so that said electron beam has a colliding spot describing a linear, circular, or two-dimensionally shaped track on said target (Column 4, Lines 18-23 and 53-57).

With respect to Claims 3 and 4, Price et al. further teach the apparatus implicitly comprises a vibration controller for controlling said vibration applying means (Column 4 Lines 18-23 and 53-57, and Column 5 Lines 52-57) based on a temperature measured adjacent a spot of electron beam collision (Column 5, Lines 52-57), said controller arranged to control the vibration amplitude more than the electron beam diameter and variable (Column 5, Lines 52-57).

With respect to Claim 11, Price et al. further teach said target (122) has a thickness up to twice the depth of electron penetration (Column 2, Lines 49-50) calculated from a tube voltage and said target material (Column 5, Lines 52-57).

With respect to Claim 12, Price et al. further teach said vibration applying means is arranged to displace said target (Figures 3-5).

With respect to Claim 16, Price et al. further teach said target (122) is disposed at an angle to said electron beam (Figures 4-5).

Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over DuMond and in view of U.S. Patent to Koshishiba (USP# 5,629,969).

With respect to Claim 17, DuMond teaches an apparatus for generating x-rays (Title) by irradiating a target (11) with an electron beam (E), comprising:

- an electron gun (7) operative for emitting electrons (E, Figure 2);
- vibration applying means (12) for vibrating said target in directions parallel to a surface thereof (Figure 2, and Page 2 Column 2 Lines 63-75 through Column 2 Lines 1-8 and 56-59);
- a target holder (28, 29) connected to the vibration applying means (12) to hold the target within a bore (2, Figure 1); and
- a vacuum vessel operative for containing the electron gun (7), the vibration applying means (12), and the target (11) in a vacuum (Page 1 Column 2 Lines 53-55, and Page 2 Column 1 Line 1).

DuMond does not teach an electron lens having a bore extending therethrough for receiving and converging the emitted electrons.

Koshishiba teaches an apparatus for generating x-rays (Abstract) comprising an electron gun (5) emitting electrons at a target (2, Figure 4), wherein there is an electron lens (6) having a bore extending therethrough (Figure 4) which focuses the emitted

electrons onto the target in a minute focal spot (Column 3 Lines 30-35, and Column 4 Lines 10-18).

It would have been obvious to one of ordinary skill in the art to employ the electron lens of Koshishiba in the apparatus of DuMond, to achieve a small focal spot size for the emitted electron beam, thereby obtaining a high resolution of the x-ray image of a sample examined by the apparatus, as taught by Koshishiba (Column 3 Lines 30-35, and Column 4 Lines 10-18).

### ***Response to Arguments***

Applicant's arguments with respect to claims 1-5 and 7-17 have been considered but are moot in view of the new ground(s) of rejection. However, an issue still remains concerning the Hirokawa et al. reference.

With respect to Claim 1, Applicant asserts that there is no motivation to combine the piezoelectric device of Hirokawa et al. in the apparatus of DuMond, Catlin, Carter, or Price, as the piezoelectric device of Hirokawa vibrates an x-ray mirror or window and not the x-ray target itself. The Examiner respectfully disagrees.

The piezoelectric device of Hirokawa is not relied upon for vibrating the target, but rather as an alternate means of vibration to the vibrating means of DuMond, Catlin, Carter, and/or Price. The primary references contain means to vibrate the target, and the piezoelectric device of Hirokawa is an alternate means to achieve said vibration within the context and environment of x-ray tubes (see Figure 1A and Column 4, Lines 7-53, Hirokawa) which provides a reduction in parts, expense, and complexity over the

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motor driven circuitry used in the primary references, as taught by Hirokawa and cited in the above and prior actions.

Therefore, the use of Hirokawa in the above 103(a) rejections is maintained.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patents to: Wittry (USP# 5,892,809), Arndt et al. (USP# 6,282,263), and Okada et al. (USP# 7,046,767), regarding the use of electron lenses to focus electron beams onto an x-ray target.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anastasia Midkiff whose telephone number is 571-272-5053. The examiner can normally be reached on M-F 7-4.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Glick can be reached on 571-272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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ASM  
11/11/06



EDWARD J. GLICK  
SUPERVISORY PATENT EXAMINER